



MORBIDITY AND MORTALITY WEEKLY REPORT

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*International Notes***Earthquake Disaster — Luzon, Philippines**

At 4:30 p.m. on July 16, 1990, an earthquake measuring 7.7 on the Richter scale struck northern and central Luzon Island in the Philippines, resulting in substantial morbidity and mortality and widespread damage. Among the areas severely affected were the mountain city of Baguio; the coastal areas in La Union; Dagupan city in Pangasinan; and the central plain area—primarily Cabanatuan city in Nueva Ecija and mountainous Nueva Viscaya. Buildings in Baguio and Cabanatuan suffered extensive structural failure, and buildings in the coastal areas in La Union and in Dagupan suffered foundation failure or the effects of liquefaction*. This report summarizes preliminary data gathered by Philippine Field Epidemiology Training Program (FETP) teams on the damage, deaths, and injuries sustained in the four areas.

Baguio

The city of Baguio (1989 population: 154,000) covers 49 square kilometers (30 square miles) in the Cordillera mountains. Baguio is a major tourist destination and the principal trade and educational center in the Cordillera region. Twenty-eight buildings and 132 residences in the city were damaged or destroyed. Three hotels were totally destroyed. Two schools were severely damaged, trapping students and faculty members. A factory building collapsed and burned with workers trapped inside.

For the first 48 hours after the earthquake, the city was isolated from the rest of the country. Electric, water, and communication lines were destroyed. The city was inaccessible by land because of landslides and inaccessible by air, except to helicopters, because of damage at the airport. Food and fuel were scarce. Because hospital buildings were damaged, patients were relocated under tents set up in open spaces in front of hospitals. Damage to homes and the occurrence of many aftershocks caused most residents to set up camps in open spaces in the city. Three days after the earthquake, a main road leading to the city was cleared to enable delivery of supplies.

During the first 48 hours, rescue teams consisted of local volunteers, mainly miners and cadets from a military school in the city, who worked with their hands and

*A change in the soil from a firm material into a viscous semiliquid material that resembles quicksand.

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with picks and shovels. Foreign rescue teams with sophisticated equipment and dogs trained for rescue were able to reach the area after 48 hours.

The FETP team estimated that 1084 earthquake-related casualties occurred: 695 injured survivors and 389 fatalities (case-fatality rate: 36%). The estimated injury rate was 703 per 100,000 population; the estimated death rate was 252 per 100,000.

The FETP team conducted a case-control study to identify risk factors for earthquake-related injuries. The study included 150 cases (surviving and deceased casualties) and 305 controls.[†] Casualties ranged in age from 3 months to 70 years (mean: 25 years); 51% were male. Eighty-four (56%) casualties were at home when the earthquake struck; 19 (13%), in school; 11 (7%), in a street; and 36 (24%), in other places. The majority (74%) of casualties were inside a building during the earthquake.

The 150 casualties sustained a total of 235 injuries (average: 1.6 injuries per person). The three most common injuries were contusion (35%), fracture (14%), and laceration (12%). The most common causes of injury were being hit by falling objects (37%), being crushed or pinned by heavy objects (29%), and falling (7%).

Based on preliminary analysis, cases and controls were similar in age and sex distribution. Similar proportions of cases and controls were inside (74% and 80%, respectively) and outside (26% and 20%, respectively) buildings during the earthquake. For persons who were inside a building, risk factors included building height, type of building material, and the floor level the person was on. Persons inside buildings with seven or more floors were 35 times more likely to be injured (odds ratio [OR]=34.7; 95% confidence interval [CI]=8.1–306.9). Persons inside buildings constructed of concrete or mixed materials were three times more likely to sustain injuries (OR=3.4; 95% CI=1.1–13.5) than were those inside wooden buildings. Persons at middle levels of multistory buildings were twice as likely to be injured as those at the top or bottom levels (OR=2.3; 95% CI=1.3–4.2).

Cabanatuan

Cabanatuan (population: 176,053) is a major city in the central plain of Luzon. The city has many concrete buildings, mostly three stories high. The highest structure, a six-floor school, was the only building in Cabanatuan that collapsed during the earthquake. A total of 363 casualties (including 274 [75%] persons, primarily students, trapped in the collapsed school) were reported in Cabanatuan; 154 (42%) died. The death and injury rates were 87 and 206 per 100,000 population, respectively.

Dagupan

Dagupan (population: 112,850) is a commercial city located along the coast of Lingayen Gulf. Approximately 150 concrete buildings were located in the commercial hub; most of these were less than five stories high. Approximately 90 (60%) buildings in the city were damaged, and approximately 20 collapsed. Some structures sustained damage because liquefaction caused buildings to sink as much as 1 meter (39 inches). Because the earthquake caused a decrease in the elevation of the city, several areas were flooded.

Of 64 casualties, 47 survived and 17 died. The injury and death rates were 57 and 15 per 100,000 population, respectively. Most injuries were sustained during stam-

[†]A case was any casualty (injured or dead) resulting directly from the earthquake or aftershocks. For injured persons, information was obtained from the patients, when possible, or from other survivors; for infants and young children, from their parents or guardians; and for decedents, from survivors or from rescuers. Controls were noninjured family members or noninjured persons in refugee centers.

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pedes at a university building and a theater. Fourteen (82%) of the deaths occurred among women.

La Union

In La Union, a coastal province located in the northwestern part of Luzon, five municipalities (combined population: 132,208) were affected: Agoo, Aringay, Caba, Santo Tomas, and Tubao. Principal occupations are farming and fishing. The houses are constructed of wood, concrete, or light materials; most buildings are concrete and are less than four stories high. A total of 2387 families were dislocated when two coastal barangays (i.e., a large neighborhood or barrio) sank. Many buildings collapsed or were otherwise severely damaged. Of 493 casualties, 32 died. The injury and death rates were 349 and 24 per 100,000 population, respectively.

Patterns of Damage

The earthquake caused different patterns of damage in different parts of Luzon Island. The mountain resort of Baguio was most severely affected, probably because it had the highest population density and many tall concrete buildings, which were more susceptible to seismic damage. Because all routes of communication, roads, and airport access were severed for several days, relief efforts were also the most difficult there. Relief efforts were further hampered by daily drenching, cold rains. Because Baguio is home to a large mining company and a military academy, experienced miners and other disciplined volunteers played a crucial role in early rescue efforts. Rescue teams arriving from Manila and elsewhere in Luzon were able to decrease mortality from major injuries. Surgeons, anesthesiologists, and specialized equipment and supplies were brought to the area, and victims were promptly treated. Patients requiring specialized care (e.g., hemodialysis) not available in the disaster area were airlifted to tertiary hospitals in metropolitan Manila. Outside of Baguio, destruction tended to be more diffuse. Damage was caused by landslides in the mountains and settling in coastal areas. Relief efforts in these areas were prompt and successful, partly because the areas remained accessible.

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Editorial Note: As in previous earthquake disasters, the most important relief work in the Philippines was done by survivors during the first 48 hours after the shock (1,2). Because earthquake relief efforts may be hampered by a lack of accurate data (3,4), the Department of Health (DOH) deployed teams of FETP epidemiologists within 24 hours to each site to provide accurate estimates of casualties, damage, and needs.

Because Baguio was accessible only by air, setting priorities for relief shipments was vital. Daily reports were provided for local disaster coordinators and to headquarters in Manila. Information gathering was possible but was constrained by the lack of telephones, power, and transportation and by general confusion.

On July 19, 3 days after the earthquake, the priority of relief efforts shifted from treatment of injuries to public health concerns. For example, numerous broken pipes completely disrupted water systems, limiting the availability of potable water, and refugees who camped in open areas had no adequate toilet facilities. Early efforts at providing potable water by giving refugees chlorine granules were unsuccessful.

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Most potable water was distributed from fire engines, and DOH sanitarians chlorinated the water before it was distributed. Surveys of refugee areas showed few latrines; these had to be dug by the DOH.

Although national disaster plans had worked well in typhoons and floods, their effectiveness was undermined by the unprecedented demands caused by the earthquake. High-level government officials, such as cabinet secretaries and agency heads, were quickly assigned to manage emergency relief in different areas.

Important factors contributing to the risk for death after the collapse of buildings include entrapment, the severity of injuries, length of time victims can survive without medical attention, and time to rescue and medical treatment (5-7). Earthquake drills are important, particularly in relation to appropriate occupant behavior at the time of an earthquake (8). Deaths and injuries caused by stampedes in schools underlined the need for earthquake drills.

A widespread public expectation was that epidemics of communicable diseases would follow the earthquake. However, sentinel surveillance sites established in each of the earthquake areas did not detect increases in diarrhea, measles, or other diseases, confirming experiences after previous earthquakes (9). This information was released to the press frequently and helped to quell rumors, a major concern in the second and third weeks following the earthquake. In addition, reliable epidemiologic data permitted relief managers to avoid displacing important relief goods with unnecessary medicines (sorting and storing large quantities of inappropriate medicines has been a problem after other recent earthquakes [10]).

Many nations contributed effectively to the successful relief effort. The most useful international relief was low-technology assistance, such as tents, blankets, and food. Teams equipped with high-technology equipment to detect survivors arrived after most of the survivors had already been extricated. A team from Singapore remained for several weeks to provide a range of services, including medical care and cooking; these services were particularly useful. In addition, in response to a request from the Philippine FETP, the government of Mexico provided information based on its experience with the recent earthquake in Mexico; this information aided the Philippines in its public health response.

Future international relief efforts should focus more on problems that arise in the days after earthquakes. In Baguio, these needs were 1) engineers to establish whether buildings are habitable and to help reestablish water and communication lines, 2) volunteers to help remove corpses from the wreckage, 3) psychologists and psychiatrists to attend to the psychological problems of helplessness, depression, and anger in survivors and rescuers, and 4) tents and food.

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*Epidemiologic Notes and Reports***Nursing Home Outbreaks of Invasive Group A Streptococcal Infections — Illinois, Kansas, North Carolina, and Texas**

During the winter of 1989-90, outbreaks of invasive group A streptococcal infections in one nursing home each in Illinois, Kansas, North Carolina, and Texas were reported to CDC. This report summarizes the clinical, laboratory, and epidemiologic features of these outbreaks.

A total of 18 residents had invasive disease, and 10 (56%) died. Clinical features of infection included fever, altered mental status, and symptoms referable to the specific focus of infection. Eight patients had pneumonia with cough and respiratory distress; seven had cutaneous infections (usually at the site of a pre-existing skin lesion); two had sinusitis; and three had no apparent focus for infection. Serious complications included necrotizing fasciitis requiring debridement or amputation, renal failure, and adult respiratory distress syndrome (ARDS). Several patients had illnesses consistent with streptococcal toxic shock-like syndrome (1). Documented group A streptococcal infection in nursing home staff was rare; two nurses had culture-confirmed pharyngitis, and one, pneumonia.

Isolates from patients from each of the outbreaks were typed at CDC. Two outbreaks were caused by M-nontypeable, T-11/12 strains; one, by M-1, T-1; and one, by M-29, T-nontypeable strains. In all four nursing homes, culture surveys of all residents and staff were performed to evaluate throat and wound carriage of group A streptococci. Eleven (4%) of 312 residents and four (1%) of 297 staff had asymptomatic pharyngeal carriage. At each nursing home, the pharyngeal and invasive isolates were the same serotype. No wound swab cultures were positive.

In one nursing home, a case-control investigation was conducted to determine risk factors for infection. This study suggested person-to-person spread of infection between close contacts, with statistically significant clustering of case-patients by room. No other risk factors were identified.

In three nursing homes, prophylactic antimicrobial therapy was instituted after the survey of residents and staff was completed. In two, full courses of therapy were given to all residents and staff; in the third, therapy was discontinued when all surveillance cultures were reported as negative. In the fourth nursing home, antimicrobial therapy was given only to those who were culture positive. No further cases of infection occurred after these interventions.

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Editorial Note: Residents of nursing homes are at increased risk for many infectious diseases. Outbreaks of infection in this setting are facilitated by the close contact of persons who are highly susceptible to infection because of their ages and underlying illnesses. In addition, knowledge of infection-control practices by nursing home personnel and the ability to isolate or cohort patients in a nursing home are often limited (2).

In recent years, invasive group A streptococcal infections have occurred more commonly throughout the United States (1,3). Recent population-based studies have established an incidence of 4–5 cases per 100,000 persons (CDC, unpublished data). The risk for streptococcal bacteremia and the case-fatality rate are highest in the elderly (4,5). Additional outbreaks in nursing homes are possible because of the increasing rate of severe group A streptococcal infections, the propensity of this organism to cause disease in the elderly, and the ability of this organism to spread by the person-to-person route.

These four nursing home outbreaks shared several features: 1) a cutaneous or respiratory focus of infection in most patients, 2) high case-fatality rates, 3) uncommon pharyngeal carriage among residents and staff, 4) lack of documentation of carriage in skin lesions not showing evidence of an acute cellulitis, and 5) apparent person-to-person spread between close contacts. Two other reported nursing home outbreaks were characterized by similar features (6,7).

Although specific guidelines for controlling group A streptococcal infections in nursing homes have not been published, the CDC guidelines for isolation precautions in hospitals should be applied to these settings (8). Isolation of patients until 24 hours of effective antimicrobial therapy has been completed is important. The role of culture surveys and antimicrobial prophylaxis is unclear; because the streptococcal carriage rate is low, treatment of all patients and staff probably is unnecessary. However, throat cultures could be obtained from all nursing home residents and staff followed by institution of antimicrobial therapy; when culture results are available, a course of therapy could be completed only by those who are culture positive or who have symptoms consistent with streptococcal infection. Penicillin is the recommended antimicrobial for treating group A streptococcal infections; erythromycin is recommended for penicillin-allergic persons.

The development of more effective approaches to the control of invasive group A streptococcal infections in nursing home residents and in other settings requires additional information about clusters of this disease. Descriptions of clusters of two or more cases of invasive group A streptococcal infections may be reported to CDC's Respiratory Diseases Branch, Division of Bacterial and Mycotic Diseases, Center for Infectious Diseases, through state health departments. Serotyping of isolates from clusters and case report forms are available from CDC.

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Common Source Outbreak of Relapsing Fever — California

In August and September 1989, six persons who had each at different times spent the night in the same cabin at Big Bear Lake, San Bernardino County, California, developed sudden onset of high fever with severe headache, prostration, nausea, and vomiting. Four patients were initially considered to have viral gastroenteritis and received no antibiotic therapy. When fevers recurred, relapsing fever was suspected and confirmed serologically in two of these patients. Two of the four patients were treated with tetracycline and recovered. Two recovered without treatment after three relapses.

The fifth patient, an elderly woman, was admitted to intensive care with septic shock. Laboratory findings included spirochetes visible in a Giemsa-stained smear of peripheral blood, neutrophilic pleocytosis of the cerebrospinal fluid, peripheral leukocytosis, thrombocytopenia, and hypophosphatemia. She was treated with intravenous doxycycline and developed a probable Jarisch-Herxheimer reaction before recovering fully.

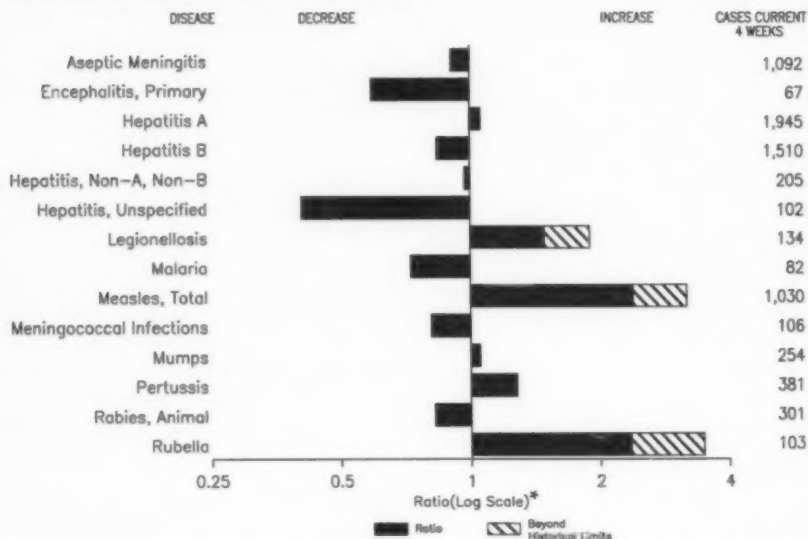
For the sixth patient, the suspected diagnosis of relapsing fever was confirmed by the identification of spirochetes in a thick blood smear. This patient was treated promptly with tetracycline and recovered rapidly.

The Santa Barbara and San Bernardino county health departments were advised of the outbreak and conducted an epidemiologic and environmental investigation of the Big Bear Lake area and the cabin used by each of the six patients. The investigators noted a large population of California ground squirrels and chipmunks and the widespread practice by visitors of feeding these animals. Inhabited ground-squirrel burrows were found under the cabin. The cabin was fumigated to kill vectors (ticks). No other cabins were known to be associated with illness. In the spring of 1990, educational literature about relapsing fever and prevention of the disease was distributed to cabin owners in the Big Bear Lake area.

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Editorial Note: In the United States, relapsing fever results from infection by the spirochetes *Borrelia hermsii* and *B. turicatae*. The disease, which occurs in the western United States, is transmitted to humans principally by the bites of the infected ticks *Ornithodoros hermsi* and *O. turicata* but possibly also by *O. parkeri*

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FIGURE 1. Notifiable disease reports, comparison of 4-week totals ending August 25, 1990, with historical data — United States

*Ratio of current 4-week total to mean of 15 4-week totals (from comparable, previous, and subsequent 4-week periods for past 5 years).

TABLE 1. Summary — cases of specified notifiable diseases, United States, cumulative, week ending August 25, 1990 (34th Week)

| | Cum. 1990 | Cum. 1990 |
|------------------------------------|-----------|-----------|
| AIDS | 27,283 | 1 |
| Anthrax | - | - |
| Botulism: Foodborne | 9 | 77 |
| Infant | 39 | 1 |
| Other | 6 | 31,180 |
| Brucellosis | 47 | 166 |
| Cholera | 3 | 685 |
| Congenital rubella syndrome | 3 | 35 |
| Diphtheria | 2 | 214 |
| Encephalitis, post-infectious | 65 | 19 |
| Gonorrhea: civilian | 430,230 | 13,926 |
| military | 5,921 | 81 |
| Leprosy | 139 | 263 |
| Leptospirosis | 29 | 383 |
| Measles: imported | 969 | |
| indigenous | 18,016 | |
| Plague | | 1 |
| Poliomyelitis, Paralytic* | | - |
| Psittacosis | | 77 |
| Rabies, human | | 1 |
| Syphilis: civilian | | 31,180 |
| military | | 166 |
| Syphilis, congenital, age < 1 year | | 685 |
| Tetanus | | 35 |
| Toxic shock syndrome | | 214 |
| Trichinosis | | 19 |
| Tuberculosis | | 13,926 |
| Tularemia | | 81 |
| Typhoid fever | | 263 |
| Typhus fever, tickborne (RMSF) | | 383 |

*Three cases of suspected poliomyelitis have been reported in 1990; five of 13 suspected cases in 1989 were confirmed and all were vaccine-associated.

TABLE II. Cases of specified notifiable diseases, United States, weeks ending August 25, 1990, and August 26, 1989 (34th Week)

| Reporting Area | AIDS | Aseptic Mening- itis | Encephalitis | | Gonorrhea (Civilian) | | Hepatitis (Viral), by type | | | | Legionel- losis | Laprosy |
|----------------|--------------|----------------------------|--------------|----------------------|-------------------------|--------------|----------------------------|--------------|--------------|------------------|--------------------|---------|
| | | | Primary | Post-in- fectious | Cum. 1990 | Cum. 1989 | A | B | NA,NB | Unspec- ified | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| Cum. 1990 | Cum. 1990 | Cum. 1990 | Cum. 1990 | Cum. 1990 | Cum. 1989 | Cum. 1990 | Cum. 1990 | Cum. 1990 | Cum. 1990 | Cum. 1990 | Cum. 1990 | |
| UNITED STATES | 27,283 | 4,659 | 489 | 65 | 430,230 | 446,733 | 18,650 | 13,161 | 1,422 | 1,091 | 759 | 139 |
| NEW ENGLAND | 1,013 | 174 | 17 | - | 12,107 | 12,809 | 381 | 704 | 46 | 44 | 33 | 9 |
| Maine | 40 | 6 | 3 | - | 129 | 177 | 6 | 25 | 4 | 1 | 3 | - |
| N.H. | 53 | 16 | - | - | 119 | 115 | 6 | 29 | 4 | 2 | 4 | - |
| Vt. | 10 | 17 | 2 | - | 38 | 44 | 4 | 37 | 4 | - | 5 | - |
| Mass. | 566 | 56 | 6 | - | 5,021 | 4,968 | 263 | 442 | 24 | 39 | 15 | 8 |
| R.I. | 53 | 55 | 1 | - | 755 | 939 | 39 | 31 | - | 2 | 6 | 1 |
| Conn. | 291 | 24 | 5 | - | 6,045 | 6,566 | 63 | 140 | 10 | - | - | - |
| MID. ATLANTIC | 8,462 | 459 | 35 | 4 | 58,889 | 66,547 | 2,652 | 1,844 | 156 | 79 | 240 | 17 |
| Update N.Y. | 1,035 | 241 | 29 | 1 | 8,894 | 10,165 | 736 | 480 | 44 | 20 | 90 | 1 |
| N.Y. City | 5,002 | 98 | 3 | 1 | 25,160 | 26,923 | 347 | 494 | 23 | 42 | 50 | 12 |
| N.J. | 1,618 | - | 1 | - | 9,736 | 9,781 | 251 | 428 | 33 | - | 43 | - |
| Pa. | 807 | 120 | 2 | 2 | 15,099 | 19,678 | 1,318 | 442 | 56 | 17 | 57 | 1 |
| E.N. CENTRAL | 1,881 | 886 | 117 | 11 | 82,041 | 79,954 | 1,433 | 1,566 | 114 | 68 | 171 | 2 |
| Ohio | 440 | 187 | 34 | 3 | 24,973 | 20,511 | 141 | 284 | 44 | 10 | 61 | - |
| Ind. | 176 | 123 | 2 | 6 | 7,240 | 5,638 | 85 | 286 | 5 | 14 | 30 | - |
| Ill. | 747 | 150 | 38 | 2 | 26,999 | 26,124 | 706 | 300 | 31 | 15 | 8 | 1 |
| Mich. | 368 | 356 | 38 | - | 18,781 | 20,796 | 259 | 449 | 24 | 29 | 52 | 1 |
| Wis. | 150 | 30 | 5 | - | 4,948 | 6,985 | 242 | 247 | 10 | - | 20 | - |
| W.N. CENTRAL | 633 | 212 | 38 | 1 | 22,202 | 19,785 | 1,076 | 594 | 95 | 25 | 38 | 1 |
| Minn. | 120 | 12 | 11 | 1 | 2,759 | 2,178 | 156 | 76 | 21 | - | - | - |
| Iowa | 25 | 25 | 5 | - | 1,638 | 1,653 | 210 | 46 | 8 | 2 | 4 | - |
| Mo. | 360 | 119 | 5 | - | 13,420 | 12,023 | 336 | 366 | 42 | 19 | 23 | - |
| N. Dak. | 2 | 9 | - | - | 95 | 93 | 10 | 4 | 2 | 1 | - | - |
| S. Dak. | 2 | 5 | 2 | - | 144 | 167 | 144 | 5 | 3 | - | - | - |
| Nebr. | 29 | 16 | 7 | - | 1,156 | 890 | 64 | 23 | 4 | - | 6 | 1 |
| Kans. | 95 | 26 | 8 | - | 3,030 | 2,781 | 156 | 74 | 15 | 3 | 5 | - |
| S. ATLANTIC | 5,650 | 982 | 105 | 19 | 123,506 | 121,105 | 2,245 | 2,524 | 217 | 169 | 121 | 5 |
| Del. | 65 | 28 | 3 | - | 2,013 | 2,005 | 89 | 68 | 6 | 1 | 6 | - |
| Md. | 560 | 119 | 14 | 1 | 13,988 | 13,661 | 784 | 363 | 31 | 9 | 49 | 3 |
| D.C. | 484 | 2 | - | - | 8,657 | 8,117 | 12 | 28 | 4 | - | - | - |
| Va. | 501 | 157 | 35 | 2 | 11,412 | 9,900 | 186 | 163 | 32 | 124 | 9 | - |
| W. Va. | 39 | 33 | 19 | - | 751 | 826 | 15 | 59 | 4 | - | 15 | 1 |
| N.C. | 408 | 88 | 23 | - | 18,964 | 18,374 | 501 | 704 | 82 | 8 | 15 | - |
| S.C. | 233 | 12 | 1 | - | 9,672 | 11,019 | 29 | 401 | 13 | 7 | 14 | - |
| Ge. | 772 | 194 | 4 | 1 | 27,206 | 23,272 | 243 | 295 | 7 | - | 10 | 1 |
| Fla. | 2,588 | 349 | 6 | 15 | 30,843 | 33,741 | 386 | 443 | 38 | 16 | - | - |
| E.S. CENTRAL | 665 | 418 | 39 | 1 | 37,510 | 35,043 | 257 | 1,004 | 105 | 4 | 46 | - |
| Ky. | 113 | 101 | 15 | - | 3,930 | 3,365 | 65 | 346 | 36 | 3 | 18 | - |
| Tenn. | 211 | 66 | 18 | 1 | 11,274 | 11,810 | 122 | 544 | 53 | - | 16 | - |
| Ala. | 144 | 174 | 6 | - | 13,166 | 11,194 | 69 | 109 | 14 | - | 12 | - |
| Miss. | 197 | 77 | - | - | 9,140 | 8,874 | 1 | 5 | 2 | 1 | - | - |
| W.S. CENTRAL | 2,975 | 446 | 23 | 6 | 43,598 | 48,784 | 1,924 | 1,341 | 62 | 175 | 38 | 30 |
| Ark. | 140 | 8 | 1 | - | 5,725 | 5,465 | 348 | 55 | 6 | 13 | 7 | - |
| La. | 457 | 62 | 6 | - | 8,071 | 8,305 | 131 | 206 | 3 | 7 | 12 | - |
| Okl. | 148 | 40 | 2 | 5 | 3,964 | 4,067 | 375 | 107 | 19 | 17 | 13 | - |
| Tex. | 2,230 | 336 | 14 | 1 | 25,808 | 27,347 | 1,070 | 973 | 34 | 138 | 6 | 30 |
| MOUNTAIN | 737 | 231 | 17 | 2 | 8,274 | 9,374 | 3,053 | 1,003 | 139 | 85 | 29 | - |
| Mont. | 10 | 3 | - | - | 116 | 129 | 88 | 49 | 5 | 4 | 2 | - |
| Idaho | 19 | 7 | - | - | 88 | 125 | 59 | 60 | 8 | - | 3 | - |
| Wyo. | 2 | 1 | 1 | - | 101 | 62 | 44 | 12 | 5 | 1 | - | - |
| Colo. | 219 | 52 | 3 | - | 1,634 | 2,090 | 199 | 107 | 31 | 30 | 5 | - |
| N. Mex. | 70 | 10 | - | - | 810 | 910 | 605 | 131 | 9 | 5 | 2 | - |
| Ariz. | 232 | 113 | 7 | - | 3,521 | 3,864 | 1,496 | 354 | 53 | 31 | 9 | - |
| Utah | 68 | 24 | 2 | - | 272 | 293 | 326 | 73 | 18 | 5 | 3 | - |
| Nev. | 117 | 21 | 4 | 2 | 1,732 | 2,101 | 236 | 217 | 10 | - | - | - |
| PACIFIC | 5,267 | 891 | 78 | 21 | 42,103 | 55,332 | 5,629 | 2,581 | 488 | 442 | 43 | 75 |
| Wash. | 437 | - | 6 | 1 | 3,448 | 4,325 | 938 | 396 | 83 | 20 | 11 | 4 |
| Oreg. | 192 | - | - | - | 1,983 | 2,033 | 579 | 278 | 37 | 7 | - | - |
| Calif. | 4,524 | 745 | 67 | 19 | 35,948 | 48,019 | 3,913 | 1,815 | 356 | 409 | 31 | 60 |
| Alaska | 22 | 84 | 4 | - | 691 | 626 | 137 | 42 | 3 | 1 | - | - |
| Hawaii | 92 | 62 | 1 | 1 | 333 | 329 | 62 | 50 | 9 | 5 | 1 | 11 |
| Guam | 1 | 2 | - | - | 149 | 111 | 9 | 1 | - | 8 | - | - |
| P.R. | 1,004 | 45 | 6 | - | 460 | 725 | 113 | 192 | 2 | 19 | - | - |
| V.I. | 10 | - | - | - | 249 | 454 | 1 | 8 | - | - | - | - |
| Amer. Samoa | - | 1 | - | - | 49 | 32 | 26 | - | - | - | - | 10 |
| C.N.M.I. | - | - | - | - | 148 | 68 | 10 | 9 | - | 15 | - | 4 |

N: Not notifiable

U: Unavailable

C.N.M.I.: Commonwealth of the Northern Mariana Islands

TABLE II. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending August 25, 1990, and August 26, 1989 (34th Week)

| Reporting Area | Malaria | Measles (Rubella) | | | | | Menin- gococcal infections | Mumps | | Pertussis | | | Rubella | | |
|----------------|---------|-------------------|--------|-----------------------|-------|--------------|----------------------------------|--------------|-------|--------------|-------|--------------|--------------|------|--------------|
| | | Indigenous | | Imported ^a | Total | | | | | | | | | | |
| | | Cum. 1990 | 1990 | Cum. 1990 | 1990 | Cum. 1990 | Cum. 1989 | Cum. 1990 | 1990 | Cum. 1990 | 1990 | Cum. 1990 | Cum. 1989 | 1990 | Cum. 1990 |
| UNITED STATES | 740 | 104 | 18,016 | 101 | 969 | 11,258 | 1,704 | 53 | 3,791 | 98 | 2,175 | 2,194 | 6 | 776 | 288 |
| NEW ENGLAND | 81 | - | 236 | - | 24 | 312 | 128 | - | 36 | 9 | 266 | 258 | - | 8 | 6 |
| Maine | 1 | - | 27 | - | 2 | - | 10 | - | - | - | 10 | 9 | - | 1 | - |
| N.H. | 4 | - | - | - | 8 | 11 | 6 | - | 8 | 5 | 38 | 5 | - | 1 | 4 |
| Vt. | 5 | - | - | - | 1 | 3 | 10 | - | 1 | - | 6 | 6 | - | - | - |
| Mass. | 32 | - | 17 | - | 7 | 45 | 60 | - | 11 | 4 | 197 | 214 | - | 2 | 1 |
| R.I. | 6 | - | 27 | - | 3 | 41 | 12 | - | 5 | - | 2 | 11 | - | 1 | - |
| Conn. | 14 | - | 165 | - | 3 | 212 | 30 | - | 11 | - | 15 | 13 | - | 3 | - |
| MID. ATLANTIC | 157 | - | 976 | 1 | 150 | 906 | 251 | 2 | 247 | 46 | 395 | 110 | 6 | 11 | 29 |
| Update N.Y. | 31 | - | 200 | 15 | 110 | 138 | 93 | - | 105 | 8 | 276 | 43 | 6 | 10 | 12 |
| N.Y. City | 51 | - | 226 | - | 21 | 89 | 36 | - | - | - | - | 3 | - | - | 15 |
| N.J. | 54 | - | 188 | - | 10 | 422 | 58 | - | 62 | - | 21 | 25 | - | - | 2 |
| Pa. | 21 | - | 362 | - | 9 | 257 | 64 | 2 | 80 | 38 | 98 | 39 | - | 1 | - |
| E.N. CENTRAL | 44 | 1 | 3,201 | - | 143 | 3,629 | 233 | 1 | 386 | 11 | 445 | 303 | - | 31 | 24 |
| Ohio | 5 | - | 549 | - | 3 | 743 | 73 | - | 89 | - | 128 | 45 | - | 1 | 3 |
| Ind. | 2 | 1 | 319 | - | 1 | 78 | 23 | - | 16 | 7 | 83 | 18 | - | - | - |
| Ill. | 19 | - | 1,242 | - | 10 | 2,288 | 62 | - | 116 | - | 97 | 100 | - | 18 | 19 |
| Mich. | 14 | - | 348 | - | 125 | 307 | 54 | 1 | 126 | 4 | 60 | 30 | - | 9 | 1 |
| Wis. | 4 | - | 743 | - | 4 | 213 | 21 | - | 39 | - | 77 | 110 | - | 3 | 1 |
| W.N. CENTRAL | 10 | - | 770 | - | 13 | 638 | 58 | 2 | 111 | 3 | 108 | 157 | - | 14 | 6 |
| Minn. | 1 | - | 314 | - | 3 | 16 | 11 | - | - | 7 | 17 | 36 | - | 9 | - |
| Iowa | 2 | - | 25 | - | 1 | 9 | 1 | - | 16 | - | 15 | 13 | - | 4 | 1 |
| Mo. | 6 | - | 98 | - | - | 367 | 23 | - | 50 | - | 60 | 97 | - | - | 4 |
| N. Dak. | - | - | - | - | - | - | 1 | - | - | - | 2 | 2 | - | 1 | - |
| S. Dak. | - | - | 15 | - | 8 | - | 2 | - | - | - | 1 | 1 | - | - | - |
| Nebr. | - | - | 97 | - | 1 | 113 | 5 | - | 3 | 1 | 4 | 5 | - | - | - |
| Kans. | 1 | - | 223 | - | - | 133 | 15 | 2 | 35 | 2 | 9 | 3 | - | - | 1 |
| S. ATLANTIC | 154 | 2 | 834 | 99 | 307 | 541 | 308 | 26 | 1,573 | 4 | 180 | 197 | - | 18 | 9 |
| Dal. | 3 | - | 8 | - | 3 | 39 | 3 | - | 4 | - | 5 | 1 | - | - | - |
| Md. | 43 | - | 193 | - | 18 | 76 | 35 | 12 | 908 | - | 47 | 26 | - | 2 | 2 |
| D.C. | 10 | - | 15 | - | 7 | 35 | 11 | - | 32 | - | 14 | - | - | 1 | - |
| Va. | 39 | 2 | 72 | - | 2 | 21 | 40 | - | 90 | - | 15 | 24 | - | 1 | - |
| W. Va. | 2 | - | 6 | - | - | 51 | 13 | - | 40 | - | 14 | 20 | - | - | - |
| N.C. | 10 | - | 9 | - | 15 | 168 | 44 | - | 220 | - | 39 | 40 | - | - | 1 |
| S.C. | - | - | 4 | - | - | 3 | 21 | 12 | 45 | - | 5 | - | - | - | - |
| Ga. | 15 | - | 81 | 985 | 201 | 2 | 54 | 2 | 82 | - | 24 | 26 | - | - | - |
| Fla. | 32 | - | 446 | 15 | 61 | 146 | 87 | - | 152 | 4 | 17 | 60 | - | 14 | 6 |
| E.S. CENTRAL | 15 | - | 147 | - | 2 | 210 | 99 | 2 | 84 | - | 110 | 152 | - | 3 | 2 |
| Ky. | 2 | - | 31 | - | - | 32 | 32 | - | - | - | - | 1 | - | - | - |
| Tenn. | 8 | - | 70 | - | - | 132 | 36 | 1 | 47 | - | 45 | 93 | - | 3 | 2 |
| Ala. | 5 | - | 20 | - | 2 | 46 | 29 | 1 | 13 | - | 59 | 49 | - | - | - |
| Miss. | - | - | 26 | - | - | - | 2 | - | 24 | - | 6 | 9 | - | - | - |
| W.S. CENTRAL | 37 | 52 | 3,975 | 1 | 87 | 3,109 | 114 | 6 | 589 | 7 | 87 | 219 | - | 66 | 36 |
| Ark. | 2 | - | 12 | - | 28 | 5 | 16 | 2 | 133 | 5 | 8 | 18 | - | 3 | - |
| La. | 2 | - | 10 | - | - | 9 | 26 | 3 | 101 | - | 19 | 13 | - | - | 5 |
| Okla. | 8 | - | 175 | - | - | 106 | 15 | - | 105 | 2 | 32 | 41 | - | 1 | 1 |
| Tex. | 25 | 52 | 3,778 | 15 | 59 | 2,989 | 57 | 1 | 250 | - | 28 | 147 | - | 62 | 30 |
| MOUNTAIN | 18 | 49 | 796 | - | 91 | 372 | 53 | 5 | 299 | 2 | 188 | 498 | - | 105 | 35 |
| Mont. | 1 | - | - | - | 1 | 13 | 10 | - | 1 | - | 26 | 29 | - | - | - |
| Idaho | 3 | - | 16 | - | 10 | 2 | 5 | 1 | 142 | - | 36 | 65 | - | 49 | 32 |
| Wyo. | - | - | - | - | 11 | - | - | - | 2 | - | - | - | - | - | 1 |
| Colo. | 2 | - | 89 | - | 42 | 73 | 17 | - | 21 | 1 | 63 | 43 | - | 4 | - |
| N. Mex. | 3 | - | 81 | - | 12 | 31 | 6 | N | N | 1 | 15 | 21 | - | - | - |
| Ariz. | 8 | - | 274 | - | 12 | 137 | 4 | 4 | 110 | - | 34 | 326 | - | 30 | - |
| Utah | - | 48 | 126 | - | - | 113 | 5 | - | 8 | - | 10 | 13 | - | 1 | - |
| Nev. | 1 | 1 | 210 | - | 3 | 3 | 6 | - | 15 | - | 4 | 1 | - | 8 | 1 |
| PACIFIC | 244 | - | 7,081 | - | 152 | 1,541 | 460 | 9 | 466 | 16 | 396 | 300 | - | 520 | 141 |
| Wash. | 17 | - | 202 | - | 69 | 51 | 59 | - | 41 | 13 | 101 | 120 | - | - | - |
| Oreg. | 12 | - | 168 | - | 44 | 28 | 53 | N | N | 3 | 44 | 7 | - | 10 | 2 |
| Calif. | 210 | - | 6,625 | - | 33 | 1,435 | 336 | 7 | 407 | - | 217 | 166 | - | 500 | 118 |
| Alaska | 2 | - | 78 | - | 2 | 1 | 8 | - | 4 | - | 4 | - | - | - | - |
| Hawaii | 3 | - | 8 | - | 4 | 29 | 4 | 2 | 14 | - | 30 | 7 | - | 10 | 21 |
| Guam | 3 | U | - | U | 1 | 2 | - | U | 3 | U | - | 1 | U | - | - |
| P.R. | 2 | - | 808 | - | - | 466 | 9 | - | 7 | - | 6 | 4 | - | - | 7 |
| V.I. | - | - | 21 | - | 3 | 4 | - | - | 7 | - | - | - | - | - | - |
| Amer. Samoa | 35 | U | 190 | U | - | - | - | U | 19 | U | - | - | U | - | - |
| C.N.M.I. | - | U | - | U | - | - | - | U | 8 | U | 4 | - | U | - | - |

*For measles only, imported cases includes both out-of-state and international importations.

N: Not notifiable

U: Unavailable

¹International

²Out-of-state

TABLE II. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending August 25, 1990, and August 26, 1989 (34th Week)

| Reporting Area | Syphilis (Civilian) (Primary & Secondary) | | Toxic- shock Syndrome | Tuberculosis | | Tula- remia | Typhoid Fever | Typhus Fever (Tick-borne) (RMSF) | Rabies, Animal |
|----------------|--|--------------|-----------------------------|--------------|--------------|----------------|------------------|--|----------------|
| | Cum. 1990 | Cum. 1989 | Cum. 1990 | Cum. 1990 | Cum. 1989 | Cum. 1990 | Cum. 1990 | Cum. 1990 | Cum. 1990 |
| UNITED STATES | 31,160 | 27,931 | 214 | 13,926 | 13,699 | 81 | 263 | 383 | 2,747 |
| NEW ENGLAND | 1,158 | 1,101 | 15 | 340 | 383 | 2 | 21 | 16 | 4 |
| Maine | 5 | 8 | 5 | - | 12 | - | - | - | - |
| N.H. | 40 | 10 | 1 | 3 | 17 | - | - | - | - |
| Vt. | 1 | - | - | 7 | 7 | - | - | - | 2 |
| Mass. | 453 | 337 | 8 | 105 | 183 | 2 | 20 | 15 | - |
| R.I. | 12 | 21 | 1 | 43 | 42 | - | - | - | - |
| Conn. | 647 | 725 | 1 | 102 | 102 | - | 1 | 1 | 2 |
| MID. ATLANTIC | 6,375 | 5,735 | 22 | 3,547 | 2,835 | 1 | 66 | 17 | 638 |
| Upstate N.Y. | 569 | 590 | 8 | 281 | 212 | - | 13 | 8 | 79 |
| N.Y. City | 2,966 | 2,536 | 5 | 2,231 | 1,443 | - | 36 | - | - |
| N.J. | 1,039 | 882 | - | 679 | 522 | 1 | 14 | 6 | 194 |
| Pa. | 1,801 | 1,727 | 9 | 456 | 458 | - | 3 | 3 | 365 |
| E.N. CENTRAL | 2,145 | 1,131 | 49 | 1,417 | 1,441 | 1 | 22 | 36 | 109 |
| Ohio | 362 | 88 | 17 | 236 | 257 | 1 | 5 | 28 | 5 |
| Ind. | 56 | 43 | 1 | 120 | 133 | - | 1 | 1 | 4 |
| Ill. | 866 | 519 | 7 | 725 | 855 | - | 11 | - | 21 |
| Mich. | 645 | 380 | 24 | 276 | 311 | - | 4 | 7 | 31 |
| Wis. | 216 | 101 | - | 80 | 85 | - | 1 | - | 48 |
| W.N. CENTRAL | 322 | 215 | 23 | 364 | 355 | 30 | 3 | 42 | 435 |
| Minn. | 61 | 32 | 1 | 66 | 70 | - | - | - | 159 |
| Iowa | 42 | 22 | 5 | 40 | 28 | - | - | - | 17 |
| Mo. | 166 | 112 | 8 | 175 | 167 | 22 | 3 | 27 | 19 |
| N. Dak. | 1 | 3 | - | 14 | 11 | - | - | - | 61 |
| S. Dak. | 1 | 1 | - | 9 | 18 | 3 | - | - | 19 |
| Nebr. | 9 | 17 | 3 | 14 | 16 | 3 | - | 2 | 139 |
| Kans. | 42 | 28 | 6 | 46 | 45 | 2 | - | 12 | 4 |
| S. ATLANTIC | 10,236 | 10,225 | 80 | 2,796 | 2,816 | 3 | 31 | 146 | 769 |
| Del. | 123 | 110 | 1 | 24 | 30 | - | - | 1 | 16 |
| Md. | 759 | 509 | 1 | 214 | 233 | - | 8 | 14 | 283 |
| D.C. | 690 | 608 | 1 | 98 | 132 | - | - | - | - |
| Va. | 563 | 347 | 2 | 246 | 232 | 1 | 2 | 15 | 132 |
| W. Va. | 57 | 11 | - | 49 | 52 | - | - | - | 29 |
| N.C. | 1,161 | 671 | 10 | 361 | 350 | 1 | 2 | 73 | 4 |
| S.C. | 664 | 560 | 2 | 311 | 338 | 1 | 1 | 34 | 94 |
| Ge. | 2,835 | 2,590 | 1 | 468 | 458 | - | - | 9 | 148 |
| Fla. | 3,584 | 4,819 | 2 | 1,025 | 1,091 | - | 17 | - | 63 |
| E.S. CENTRAL | 2,882 | 1,852 | 12 | 1,064 | 1,106 | 7 | 2 | 53 | 122 |
| Ky. | 97 | 39 | 2 | 268 | 267 | 1 | 1 | 6 | 34 |
| Tenn. | 1,209 | 821 | 7 | 277 | 315 | 6 | - | 40 | 27 |
| Ala. | 865 | 565 | 3 | 336 | 320 | - | 1 | 7 | 61 |
| Miss. | 751 | 427 | - | 183 | 204 | - | - | - | - |
| W.S. CENTRAL | 4,752 | 3,767 | 11 | 1,796 | 1,614 | 24 | 8 | 55 | 333 |
| Ark. | 356 | 242 | - | 229 | 165 | 17 | - | 12 | 37 |
| La. | 1,150 | 885 | 1 | 150 | 212 | - | - | 1 | 18 |
| Okla. | 159 | 63 | 7 | 125 | 145 | 7 | 2 | 39 | 97 |
| Tex. | 3,087 | 2,577 | 3 | 1,294 | 1,092 | - | 6 | 3 | 181 |
| MOUNTAIN | 557 | 408 | 24 | 329 | 300 | 10 | 11 | 10 | 139 |
| Mont. | - | 1 | - | 22 | - | - | - | 4 | 34 |
| Idaho | 6 | 1 | 2 | 9 | 20 | - | - | - | 2 |
| Wyo. | - | 3 | 2 | 3 | - | 3 | - | - | 43 |
| Colo. | 26 | 55 | 7 | 14 | 21 | 2 | - | 1 | 9 |
| N. Mex. | 29 | 21 | 3 | 78 | 54 | 3 | - | 1 | 6 |
| Ariz. | 403 | 162 | 7 | 146 | 138 | - | 16 | 1 | 25 |
| Utah | 8 | 12 | 3 | 18 | 26 | 2 | - | 3 | 6 |
| Nev. | 85 | 153 | - | 39 | 30 | - | 2 | - | 14 |
| PACIFIC | 2,753 | 3,497 | 37 | 2,271 | 2,969 | 3 | 92 | 8 | 198 |
| Wash. | 229 | 292 | 4 | 182 | 158 | 1 | 3 | - | - |
| Oreg. | 95 | 161 | - | 86 | 95 | - | 4 | 1 | 1 |
| Calif. | 2,411 | 3,032 | 32 | 1,848 | 2,557 | - | 81 | 2 | 175 |
| Alaska | 10 | 3 | - | 29 | 43 | 2 | - | - | 22 |
| Hawaii | 8 | 9 | 1 | 126 | 116 | - | 4 | 5 | - |
| Guam | 2 | 4 | - | 29 | 54 | - | - | - | - |
| P.R. | 204 | 376 | - | 66 | 200 | - | - | - | 33 |
| V.I. | 3 | 8 | - | 4 | 4 | - | - | - | - |
| Amer. Samoa | - | - | - | 11 | - | - | 1 | - | - |
| C.N.M.I. | 3 | 7 | - | 40 | 17 | - | 4 | - | - |

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending August 25, 1990 (34th Week)

| Reporting Area | All Causes, By Age (Years) | | | | | | P&I** | Total | Reporting Area | All Causes, By Age (Years) | | | | | | P&I** | Total |
|---------------------|----------------------------|-------|-------|-------|------|----|-------|-------|-----------------------|----------------------------|-------|-------|-------|------|-----|-------|-------|
| | All Ages | ≥65 | 45-64 | 25-44 | 1-24 | <1 | | | | All Ages | ≥65 | 45-64 | 25-44 | 1-24 | <1 | | |
| NEW ENGLAND | 544 | 385 | 89 | 42 | 18 | 10 | 55 | 55 | S. ATLANTIC | 1,279 | 757 | 248 | 162 | 54 | 53 | 57 | 57 |
| Boston, Mass. | 164 | 93 | 39 | 22 | 6 | 4 | 14 | 14 | Atlanta, Ga. | 151 | 90 | 26 | 27 | 7 | 1 | 10 | 10 |
| Bridgeport, Conn. | 36 | 23 | 9 | 3 | 1 | - | 3 | 3 | Baltimore, Md. | 170 | 97 | 35 | 28 | 8 | 2 | 5 | 5 |
| Cambridge, Mass. | 18 | 16 | 2 | - | - | - | 1 | 1 | Charlotte, N.C. | 81 | 49 | 23 | 6 | - | 3 | 5 | 5 |
| Fall River, Mass. | 24 | 20 | 4 | - | - | - | 2 | 2 | Jacksonville, Fla. | 91 | 61 | 11 | 11 | 6 | 2 | 4 | 4 |
| Hartford, Conn. | 50 | 31 | 8 | 6 | 5 | - | 8 | 8 | Miami, Fla. | 169 | 97 | 27 | 27 | 7 | 11 | 4 | 4 |
| Lowell, Mass. | 20 | 16 | 3 | - | 1 | - | 1 | 1 | Norfolk, Va. | 70 | 39 | 12 | 4 | 3 | 12 | 1 | 1 |
| Lynn, Mass. | 15 | 13 | 2 | - | - | - | 3 | 3 | Richmond, Va. | 78 | 53 | 18 | 5 | 2 | - | 7 | 7 |
| New Bedford, Mass. | 27 | 25 | 1 | 1 | - | - | 3 | 3 | Savannah, Ga. | 55 | 34 | 10 | 5 | 2 | 4 | 5 | 5 |
| New Haven, Conn. | 31 | 23 | 3 | 2 | 1 | 2 | 2 | 2 | St. Petersburg, Fla.† | 61 | 49 | 7 | 2 | 1 | 2 | 6 | 6 |
| Providence, R.I. | 33 | 23 | 5 | 3 | 2 | - | 4 | 4 | Tampa, Fla. | 72 | 46 | 14 | 6 | 4 | 2 | 4 | 4 |
| Somerville, Mass. | 8 | 6 | 1 | - | - | 1 | - | 1 | Washington, D.C.‡ | 251 | 119 | 61 | 39 | 14 | 14 | 6 | 6 |
| Springfield, Mass. | 35 | 27 | 4 | 2 | 1 | 1 | 2 | 2 | Wilmington, Del. | 30 | 23 | 4 | 2 | - | - | - | - |
| Waterbury, Conn. | 50 | 31 | 8 | 3 | 1 | 1 | 6 | 6 | E.S. CENTRAL | 798 | 481 | 174 | 70 | 42 | 30 | 27 | 27 |
| Worcester, Mass. | 50 | 41 | 5 | 2 | 1 | 1 | 6 | 6 | Birmingham, Ala. | 104 | 60 | 22 | 14 | 3 | 5 | 1 | 1 |
| MID. ATLANTIC | 2,685 | 1,734 | 538 | 294 | 71 | 47 | 131 | 131 | Chattanooga, Tenn. | 66 | 48 | 13 | 3 | 2 | - | 4 | 4 |
| Albany, N.Y. | 49 | 35 | 10 | 3 | - | 1 | 2 | 2 | Knoxville, Tenn. | 94 | 52 | 25 | 8 | 7 | 2 | 2 | 2 |
| Allentown, Pa. | 19 | 15 | 3 | 1 | - | - | 2 | 2 | Louisville, Ky. | 99 | 59 | 27 | 4 | 5 | 4 | 5 | 5 |
| Buffalo, N.Y. | 110 | 69 | 29 | 4 | 6 | 2 | 2 | 2 | Memphis, Tenn. | 137 | 76 | 29 | 13 | 8 | 4 | 2 | 2 |
| Camden, N.J. | 41 | 22 | 10 | 4 | 1 | 4 | 3 | 3 | Mobile, Ala. | 137 | 75 | 28 | 19 | 11 | 4 | 2 | 2 |
| Elizabeth, N.J. | 19 | 14 | 2 | 2 | 1 | - | - | - | Montgomery, Ala. | 39 | 27 | 4 | 3 | 5 | - | 1 | 1 |
| Erie, Pa.† | 40 | 34 | 3 | 2 | 1 | - | 1 | 1 | Nashville, Tenn. | 122 | 84 | 26 | 6 | 1 | 5 | 5 | 5 |
| Jersey City, N.J.‡ | 46 | 31 | 8 | 6 | - | 1 | 1 | 1 | W.S. CENTRAL | 1,764 | 1,112 | 359 | 188 | 64 | 39 | 75 | 75 |
| N.Y. City, N.Y. | 1,340 | 837 | 265 | 181 | 34 | 23 | 50 | 50 | Austin, Tex. | 53 | 36 | 12 | 5 | - | - | 3 | 3 |
| Newark, N.J. | 76 | 35 | 11 | 18 | 8 | 4 | 6 | 6 | Baton Rouge, La. | 55 | 37 | 8 | 5 | 2 | 3 | 1 | 1 |
| Paterson, N.J. | 33 | 21 | 8 | 4 | - | - | 2 | 2 | Corpus Christi, Tex. | 41 | 30 | 7 | 2 | 1 | 1 | 2 | 2 |
| Philadelphia, Pa. | 484 | 303 | 116 | 41 | 12 | 11 | 33 | 33 | Dallas, Tex. | 215 | 128 | 38 | 30 | 13 | 6 | 8 | 8 |
| Pittsburgh, Pa.† | 68 | 43 | 18 | 7 | - | - | 2 | 2 | El Paso, Tex. | 43 | 26 | 9 | 5 | 3 | - | 3 | 3 |
| Reading, Pa. | 32 | 29 | 2 | - | 1 | - | 3 | 3 | Fort Worth, Tex. | 93 | 59 | 14 | 8 | 5 | 6 | 4 | 4 |
| Rochester, N.Y. | 126 | 91 | 25 | 6 | 3 | 1 | 13 | 13 | Houston, Tex.‡ | 734 | 436 | 169 | 88 | 24 | 16 | 18 | 18 |
| Schenectady, N.Y. | 25 | 21 | 1 | 2 | 1 | - | - | - | Little Rock, Ark. | 80 | 58 | 17 | 3 | 1 | 2 | 2 | 2 |
| Scranton, Pa.† | 30 | 24 | 5 | 1 | - | - | 3 | 3 | New Orleans, La. | 107 | 68 | 23 | 13 | 1 | 1 | - | - |
| Syracuse, N.Y. | 62 | 48 | 10 | 4 | - | - | 2 | 2 | San Antonio, Tex. | 185 | 125 | 35 | 17 | 7 | 1 | 14 | 14 |
| Trenton, N.J. | 34 | 22 | 8 | 4 | - | - | 2 | 2 | Shreveport, La. | 53 | 36 | 10 | 4 | 2 | 1 | 6 | 6 |
| Utica, N.Y. | 23 | 19 | 1 | 1 | 2 | - | 2 | 2 | Tulsa, Okla. | 105 | 73 | 17 | 7 | 5 | 2 | 9 | 9 |
| Yonkers, N.Y. | 28 | 21 | 3 | 3 | 1 | - | 4 | 4 | MOUNTAIN | 609 | 384 | 119 | 71 | 17 | 18 | 26 | 26 |
| E.N. CENTRAL | 2,264 | 1,466 | 451 | 190 | 67 | 90 | 112 | 112 | Albuquerque, N. Mex. | 66 | 38 | 13 | 9 | 2 | 4 | 5 | 5 |
| Akron, Ohio | 67 | 41 | 9 | 2 | 4 | - | 1 | 1 | Colo. Springs, Colo. | 37 | 23 | 9 | 2 | 2 | 1 | 3 | 3 |
| Canton, Ohio | 46 | 35 | 10 | - | 1 | - | 4 | 4 | Denver, Colo. | 82 | 51 | 9 | 13 | 4 | 5 | 2 | 2 |
| Chicago, Ill.‡ | 564 | 362 | 125 | 45 | 10 | 22 | 16 | 16 | Las Vegas, Nev. | 92 | 55 | 27 | 8 | 1 | 1 | 1 | 1 |
| Cincinnati, Ohio | 138 | 83 | 24 | 12 | 11 | 8 | 13 | 13 | Ogden, Utah | 20 | 15 | - | 3 | 2 | - | 2 | 2 |
| Cleveland, Ohio | 132 | 82 | 28 | 12 | 4 | 6 | 7 | 7 | Phoenix, Ariz. | 139 | 82 | 31 | 20 | 4 | 2 | 3 | 3 |
| Columbus, Ohio | 185 | 122 | 32 | 11 | 4 | 16 | 13 | 13 | Pueblo, Colo. | 19 | 11 | 4 | 4 | - | - | 4 | 4 |
| Dayton, Ohio | 117 | 75 | 20 | 14 | 4 | 4 | 3 | 3 | Salt Lake City, Utah | 47 | 29 | 6 | 9 | - | 3 | - | - |
| Detroit, Mich. | 238 | 124 | 63 | 28 | 8 | 15 | 6 | 6 | Tucson, Ariz. | 107 | 80 | 20 | 3 | 2 | 2 | 6 | 6 |
| Evansville, Ind. | 26 | 20 | 4 | 2 | - | - | 2 | 2 | PACIFIC | 1,977 | 1,289 | 340 | 208 | 87 | 47 | 124 | 124 |
| Fort Wayne, Ind. | 70 | 45 | 16 | 6 | 3 | - | 5 | 5 | Berkeley, Calif. | 18 | 14 | 3 | - | 1 | - | - | - |
| Gary, Ind. | 27 | 12 | 9 | 2 | 4 | - | 1 | 1 | Fresno, Calif. | 58 | 35 | 8 | 7 | 6 | 2 | 9 | 9 |
| Grand Rapids, Mich. | 66 | 41 | 11 | 6 | 5 | 3 | 12 | 12 | Glendale, Calif.‡ | 26 | 21 | 4 | 1 | - | - | 1 | 1 |
| Indianapolis, Ind. | 161 | 110 | 27 | 16 | 4 | 4 | 6 | 6 | Honolulu, Hawaii | 95 | 69 | 15 | 7 | 3 | 1 | 18 | 18 |
| Madison, Wis.‡ | 37 | 26 | 7 | 4 | - | - | 2 | 2 | Long Beach, Calif. | 92 | 53 | 21 | 3 | 4 | 11 | 13 | 13 |
| Milwaukee, Wis. | 129 | 97 | 20 | 9 | - | 3 | 1 | 1 | Los Angeles, Calif.‡ | 489 | 312 | 86 | 66 | 26 | 6 | 19 | 19 |
| Peoria, Ill. | 40 | 32 | 4 | 4 | - | 3 | 5 | 5 | Oakland, Calif. | 46 | 28 | 5 | 7 | 4 | 1 | 3 | 3 |
| Rockford, Ill. | 44 | 34 | 4 | 4 | 1 | 1 | 3 | 3 | Pasadena, Calif. | 18 | 11 | 3 | 3 | 1 | - | 2 | 2 |
| St. Louis, Mo. | 31 | 20 | 9 | 2 | - | - | 1 | 1 | Portland, Oreg. | 141 | 95 | 24 | 14 | 6 | 2 | 5 | 5 |
| Toledo, Ohio | 102 | 70 | 17 | 11 | 3 | 1 | 7 | 7 | Sacramento, Calif. | 154 | 107 | 26 | 14 | 4 | 3 | 9 | 9 |
| Youngstown, Ohio | 54 | 35 | 12 | 4 | - | 3 | 1 | 1 | San Diego, Calif. | 296 | 199 | 52 | 27 | 11 | 5 | 21 | 21 |
| W.N. CENTRAL | 690 | 488 | 112 | 51 | 25 | 14 | 26 | 26 | San Francisco, Calif. | 150 | 84 | 31 | 27 | 5 | 3 | 4 | 4 |
| Des Moines, Iowa | 65 | 46 | 11 | 6 | 1 | 1 | 2 | 2 | San Jose, Calif. | 119 | 85 | 22 | 6 | 4 | 2 | 8 | 8 |
| Duluth, Minn. | 27 | 17 | 6 | 1 | 2 | 1 | 4 | 4 | Seattle, Wash. | 168 | 109 | 24 | 20 | 7 | 8 | 6 | 6 |
| Kansas City, Kans. | 29 | 23 | 3 | 2 | 1 | - | 1 | 1 | Spokane, Wash. | 50 | 35 | 10 | 2 | 2 | 1 | 2 | 2 |
| Kansas City, Mo. | 119 | 76 | 18 | 18 | 5 | 2 | 7 | 7 | Tacoma, Wash. | 47 | 32 | 6 | 4 | 3 | 2 | 4 | 4 |
| Lincoln, Neb. | 32 | 22 | 8 | 1 | 1 | - | 1 | 1 | TOTAL | 12,610 ^{††} | 8,096 | 2,430 | 1,276 | 445 | 348 | 633 | 633 |
| Minneapolis, Minn. | 134 | 94 | 25 | 10 | 3 | 2 | 7 | 7 | | | | | | | | | |
| Omaha, Neb. | 74 | 56 | 10 | 3 | 1 | 4 | 3 | 3 | | | | | | | | | |
| St. Paul, Minn. | 122 | 84 | 18 | 9 | 7 | 4 | 1 | 1 | | | | | | | | | |
| St. Paul, Minn. | 46 | 36 | 9 | - | 1 | - | - | - | | | | | | | | | |
| Wichita, Kans. | 42 | 34 | 4 | 1 | 3 | - | - | - | | | | | | | | | |

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

**Pneumonia and influenza.

†Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

††Total includes unknown ages.

‡Data not available. Figures are estimates based on average of past available 4 weeks.

Relapsing Fever — Continued

and *O. rudis* (1-6). These ticks normally inhabit the burrows and nests of rodents in which the natural infection cycle proceeds without apparent disease in the rodents.

Humans are incidental hosts when bitten by an infected tick. *Ornithodoros* vectors are reclusive night feeders and bites often go unnoticed. Cabins in wilderness areas are attractive nesting sites for potentially infected rodents, particularly when food is made available by cabin users. *Ornithodoros* spp. infestations of rodent nests in cabins have been associated with outbreaks reported in Spokane County, Washington, in 1968 (7) and in the Grand Canyon National Park in 1973 (8).

The clinical features in the patients in this report are unusual in the prominence of gastrointestinal symptoms and severity of illness. The evidence of meningeal inflammation in the fifth patient is of interest, given the known predilection for the nervous system of the related spirochete, *B. burgdorferi*, the causative agent of Lyme disease. The severe headaches associated with relapsing fever may reflect meningeal involvement as a relatively frequent event (9,10).

The relapsing nature of this illness is thought to be associated with the presence of antigenic variants. As an immune response develops to the predominant antigenic strain, variant strains multiply and cause a recrudescent infection. The most rapid diagnostic test is identification of spirochetes on a Giemsa- or Wright-stained thick or thin smear of peripheral blood obtained during a febrile episode. As suggested by the clinical histories in this report, tetracyclines are effective in terminating this infection (9).

Prevention of relapsing fever consists of avoiding likely tick habitats or, when this is not possible, reducing the risk of tick bites by the use of repellents or acaricides. Additional measures include fumigating nesting sites in human habitations, "rodent-proofing" buildings in endemic areas, and eliminating rodent access to unnatural food sources.

Cases of relapsing fever should be reported to local and/or state health departments. The frequency with which relapsing fever cases occur in clusters related to a single location makes an environmental evaluation of an individual case a mandatory public health preventive measure. CDC's Bacterial Zoonoses Branch, Division of Vector-Borne Infectious Diseases, Center for Infectious Diseases, requests that *B. hermsii*- and *B. turicatae*-infected ticks, *B. hermsii* and *B. turicatae* isolates, and serum samples from patients with documented infections from *B. hermsii* and *B. turicatae* be submitted for its International Borreliosis Reference Collection. These items should be sent to the Bacterial Zoonoses Branch, CDC, P.O. Box 2087, Ft. Collins, CO 80522; telephone (303) 221-6400.

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Relapsing Fever — Continued

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*Current Trends***Football-Related Spinal Cord Injuries
Among High School Players — Louisiana, 1989**

During the 1989 high school football season in Louisiana, four high school players sustained cervical spinal cord injuries (SCIs) while playing football. From 1978 through 1988, only three such injuries are known to have occurred in this state (National Center for Catastrophic Sports Injury Research, unpublished data).^{*} Louisiana law requires reporting of all SCIs to the Office of Public Health, Louisiana Department of Health and Hospitals.

Three of the injured players were defensive backs, and one was an outside linebacker/tight end. All injuries resulted in quadriplegia; three of the injuries were complete (i.e., motor and/or sensory function below the zone of injury was not preserved). The injuries occurred during evening games when the players were tackling or blocking with the head as a point of contact but not in the typical head-down or spearing position. The circumstances suggested that the mechanism of injury was an axial load on a partially-flexed neck and that the vertical force was transmitted down the length of the spine. Previous studies have shown axial loading to be the mechanism most likely to lead to permanent quadriplegia in injured athletes (1-3).

The Louisiana Safety and Sports Medicine Advisory Committee, a group formed to address the problem of SCIs among high school football players, is developing an educational program to instruct coaches and trainers on safer methods of tackling. This program may be implemented during the 1990 football season.

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Editorial Note: Based on data collected by the National Football Head and Neck Injury Registry for 1971-1975 and compared with data for 1959-1963, the incidence of football-associated cervical SCIs increased from 0.7 per 100,000 participants to 1.6 per 100,000 participants, respectively (3). More than half the injuries identified were attributed to use of the top of the helmet as the initial point of contact. This mechanism of first contact became more common because the modern helmet and face mask, developed in the 1960s and 1970s, offers greater protection in general (3). Because of the increased occurrence of these injuries, in 1976 the National Collegiate Athletic Association (NCAA) and the National Federation of High School Athletic Associations adopted rules prohibiting the deliberate use of the top of the helmet to

^{*}National Center for Catastrophic Sports Injury Research, University of North Carolina at Chapel Hill, CB8605, 311 Woollen Gym, Chapel Hill, NC 27599-8605.

Spinal Cord Injuries — Continued

strike a runner or use of the helmet to butt or ram an opponent (3,4). The overall decrease in the incidence of quadriplegia in high school football players, from 2.2 per 100,000 participants in 1976 to 0.4 per 100,000 in 1984, was attributed to the successful implementation of these rules (3).

The expected number of football-associated SCIs in Louisiana during 1989 can be estimated in two ways. Based on the 1984 national rate of 0.4 SCIs per 100,000 participants (3) and the 1989 population of Louisiana high school football players, only one such injury would be expected during a 14.5-year period. Alternatively, based on the experience in Louisiana from 1978 through 1988, one SCI would be expected during a 3.7-year period. Reasons for the occurrence of the four SCIs during the 1989 high school football season in Louisiana are unknown.

At greatest risk for football-related SCIs are players who tackle by flexing their necks and using the tops of their helmets to strike opponents (1-3). Suggested strategies to prevent football-related cervical SCIs include educating coaches and participants about proper tackling techniques, enforcing existing tackling rules (1-6), educating officials about the mechanisms of injury, strengthening the neck with proper conditioning exercises (1,6), requiring medical examinations before participation in football and before resumption of participation after injury (1,5), and increasing awareness among school administrators and coaches about the proper handling of any player injured during practice or competition (1,5,6).

In 1987, the Council of State and Territorial Epidemiologists recommended that traumatic SCIs be designated as reportable (7). Strengthening state-based surveillance of SCIs will aid in identifying these catastrophic injuries and assist in the planning, implementation, and evaluation of prevention programs. SCI is a targeted condition in CDC's Disabilities Prevention Program, which supports SCI surveillance and prevention activities in Louisiana.

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Update: Eosinophilia-Myalgia Syndrome Associated with Ingestion of L-Tryptophan — United States, through August 24, 1990

As of August 24, 1990, 1536 cases of eosinophilia-myalgia syndrome (EMS) had been reported to CDC from all 50 states, the District of Columbia, and Puerto Rico (Figure 1) (1-5). Twenty-seven deaths have been reported in patients who met the surveillance case definition and who used L-tryptophan-containing products (LTCs).

EMS - Continued

As of August 24, CDC had received 1117 completed report forms from state and territorial health departments. Ages of patients ranged from 4 years to 85 years (median: 48 years); 1046 (94%) of the patients were non-Hispanic white, 19 (2%) were Hispanic, 12 (1%) were black, and 40 (4%) were from other or unknown racial/ethnic groups; and 930 (83%) were female. One thousand sixty-eight (96%) patients had histories of LTCP ingestion preceding onset of symptoms. Symptom onset during or after July 1989 was reported in 946 (85%). Eight (0.7%) patients had onset on or after February 1, 1990. Three hundred sixty (32%) patients had been hospitalized for their illnesses by the time the cases were reported.

Reported by: State and territorial health departments. Div of Environmental Hazards and Health Effects, Center for Environmental Health and Injury Control, CDC.

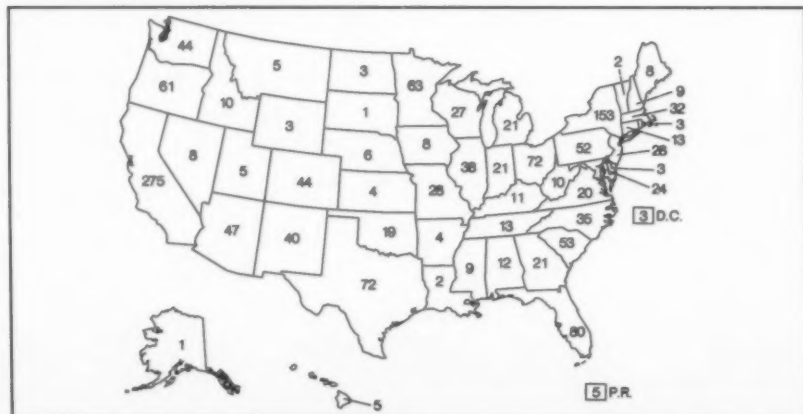
Editorial Note: On November 17, 1989, the Food and Drug Administration (FDA) recalled all dietary supplements that provided a daily dose of L-tryptophan (LT) ≥ 100 mg. By March 22, 1990, this recall had been expanded to include all LTCPs at any dosage except some protein supplements, infant formulas and special dietary foods, and intravenous and oral solutions in which small amounts of LT are needed for nutrient fortification.

The eight EMS cases reported with onset after February 1 appear to have resulted principally from continued use of LT by some persons after the FDA recall rather than from long disease latency following cessation of LTCP exposure. One patient began use of LTCPs on March 20, 1990, and became ill 1 month later, indicating that some persons may be unaware of, or choose to ignore, the FDA recall.

National surveillance figures do not fully reflect the proportion of patients ultimately hospitalized as a result of EMS. Because each case is reported only once, information regarding hospitalization of patients requiring admission after their cases are reported is not available.

The surveillance definition for reporting EMS cases to CDC requires the presence of severe, debilitating myalgias and eosinophilia ≥ 1000 eosinophils per mm^3 . Recent

FIGURE 1. Reported cases of eosinophilia-myalgia syndrome, by state - United States, through August 24, 1990



EMS — Continued

unpublished reports indicate that this case definition may be overly restrictive for clinical purposes. Many persons may have forms of EMS that are either less severe or in which the constellation of clinical findings does not include the intense eosinophilia or severe myalgias initially identified as the hallmarks of epidemic EMS. Thus far, such cases have not been the object of national surveillance.

The failure of a case to meet criteria specified in the surveillance definition does not preclude a clinical diagnosis of EMS in a person who manifests other features of EMS or who has either a lower eosinophil count or milder myalgias. As in other diseases with multiple connective tissue manifestations, a set of clear-cut diagnostic criteria with both high sensitivity and specificity may be difficult or impossible to establish. The physician's judgment and appropriate weighing of all available information are important in the clinical diagnosis of EMS.

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Analysis of L-Tryptophan for the Etiology of Eosinophilia-Myalgia Syndrome

Eosinophilia-myalgia syndrome (EMS) has been associated with consumption of L-tryptophan-containing products (LTCPs) (1,2) and most strongly associated with consumption of LTCPs produced by one manufacturer (3-5). Epidemiologic and laboratory investigations have suggested that the implicated LTCPs were contaminated (3-5). To further examine this hypothesis, CDC and the Food and Drug Administration (FDA) conducted additional laboratory studies. This report summarizes preliminary data that indicate that implicated LTCPs were contaminated with the di-tryptophan aminal of acetaldehyde (DTAA).

The laboratory investigation determined that case-associated L-tryptophan (LT) cultures were negative for bacteria and viruses and that endotoxin levels were not elevated in case-associated LT (6). Analysis of case-associated LT for 37 elements identified none at toxicologically significant concentrations.

Fifty lots of LT produced between March 1985 and June 1989 by the implicated manufacturer were analyzed by high-performance liquid chromatography (HPLC). Thirteen lots were linked to EMS cases; other lots were considered as controls because no link with cases could be identified. Several HPLC peaks (called peaks 97, 100, and 200) were identified that were predictive of case-associated LT lots. Amounts of peak 97 in LT lots from the implicated manufacturer increased dramatically between March and June 1989. Based on a Wilcoxon rank-sum test, peak 97 was the single most predictive peak ($p < 0.0001$) of case-associated LT lots. A bivariate plot of peaks 100 and 200 was as predictive as peak 97. HPLC analysis of samples exchanged between CDC and the Mayo Clinic revealed that peak 97 is likely the same as peak E (5).

L-Tryptophan — Continued

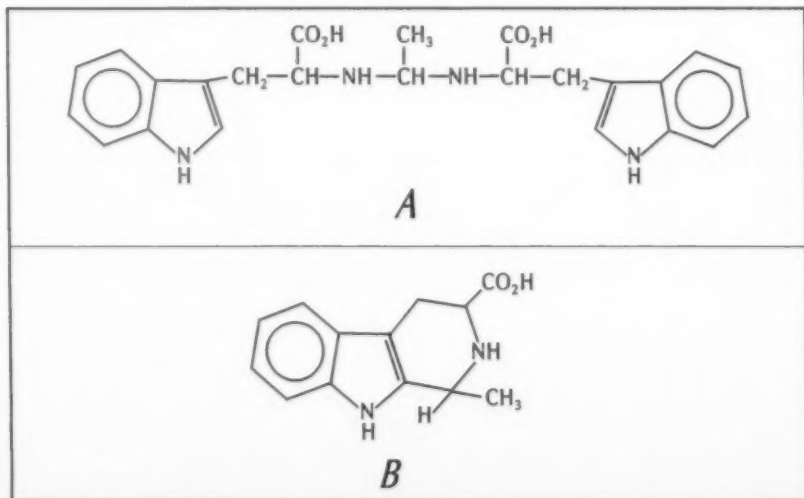
HPLC was used to isolate peak 97 from case-associated LT lots. Proton nuclear magnetic resonance indicated that peak 97 was a tryptophan derivative with its characteristic aromatic indole protons and aliphatic protons but with an unusual doublet at a chemical shift of 2.2 ppm. HPLC combined with atmospheric pressure ionization/mass spectrometry/mass spectrometry determined that peak 97 had a molecular weight of 434. High-resolution fast-atom bombardment mass spectrometry determined the exact mass of peak 97 to be 434.2020 corresponding to a molecular formula of $C_{24}H_{26}N_4O_4$, indicating that peak 97 contained two tryptophan molecules and an additional C_2H_2 . These data suggested that peak 97 was the DTAA (Figure 1A).

With LT as a standard, the concentration of peak 97 was estimated at 0.01% in a typical case-associated LT lot. Scientists at the implicated manufacturer independently arrived at the same proposed structure (R. Hinds, personal communication). Confirmation of this structure by synthesizing DTAA is in progress. In addition to peaks 97, 100, and 200, ongoing investigation is directed at 1-methyl-1,2,3,4-tetrahydro- β -carboline-3-carboxylic acid (MTCA) (Figure 1B) and bacitracin, detected in LT lots from the implicated manufacturer (6). MTCA could be produced from the breakdown of DTAA or independently formed.

Reported by: Sciex, Div of MDS Health Group, Ontario, Canada. National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health. National Institute of Mental Health, Alcohol, Drug Abuse and Mental Health Administration. Center for Food Safety and Applied Nutrition, Food and Drug Administration. Center for Infectious Diseases; Center for Environmental Health and Injury Control, CDC.

Editorial Note: The epidemiologic association of peak 97 and any other particular compound with EMS indicates that these compounds may either be the causative agent(s) or marker(s) for a different, as yet unidentified, causative agent in case-associated LT lots. Based on an average daily dose of 2 g of LT for a 70-kg person and

FIGURE 1. A: Di-L-tryptophan aminal of acetaldehyde (proposed structure for Peak 97). B: 1-Methyl-1, 2, 3, 4-tetrahydro- β -carboline-3-carboxylic acid.



L-Tryptophan — Continued

a 30-day delay before onset of EMS, the total dose of peak 97 is approximately 90 µg/kg. The toxic properties of the aminals are not well defined; however, the suspected decomposition products, the β -carbolines, exhibit a variety of biologic properties (7).

The full definition of biologic and toxic effects of the contaminants can be determined only in an animal model for EMS. A joint National Institute of Mental Health/National Institutes of Health/FDA/CDC study has recently reproduced EMS-like changes in rats (E.M. Sternberg, personal communication). Synthesizing these contaminants and testing them in the new rat model may help to clarify their relationship to the etiology and pathogenesis of EMS. Continuing studies include analyzing additional LT lots, identifying and synthesizing contaminants, and attempting to associate changes in the manufacturing process with these contaminants.

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